Money and Inflation in Israel: The Transition of an Economy to High Inflation

ZALMAN F. SHIFFER

ISRAEL is a small, open economy with a population of about 4 million and a per capita national income in 1981 of about $5,400.[1] For a long period, until the beginning of the 1970s, it had experienced relatively low inflation and high real economic achievements in terms of employment, economic growth and consumption. During the 1970s, however, Israel's economic performance deteriorated sharply: real GNP growth fell from about 9 percent to 3 percent per year, and the rate of inflation accelerated dramatically to over 100 percent per year (unemployment, however, remained relatively low for most of the decade). At the same time, the import surplus — the difference between the value of imports and exports — rose to levels that were considered unmaintainable in the long run (see tables 1 and 2).[2]

The dismal experience of the Israeli economy, like similar developments in other countries, was related to the economic adjustment to higher energy prices. Other countries also were subject to lower real growth and higher inflation since 1973. However, the acceleration of inflation was particularly acute in Israel (see table 3). In addition to the oil price shocks, Israel faced changing military and political conditions that resulted in higher levels of defense expenditures and government deficits. The deterioration of the Israeli economic performance in the 1970s was, therefore, also related to the effect of the external burdens imposed on Israel. Finally, the rapid transition to high inflation also reflected the relative low priority assigned by policymakers to the goal of price stabilization and the specific mix of policy measures used to achieve the different policy goals.

The purpose of this article is to discuss the sources and mechanisms of monetary growth in Israel I in particular the inflationary process during the past decade. Section 1 discusses the relative importance of the changes in money demand and money supply in the Israeli inflationary process. Section 2 surveys the sources of money supply growth, with special emphasis on the financing requirements of the public sector. Section 3 discusses how the exchange rate policy and the debt management policy have created a highly adaptive money supply process, and section 4 deals with the short- and long-run implications of this structure on the inflationary process. Section 5 analyzes the historical evolution of the inflationary process and, finally, section 6 offers some concluding remarks.

1. MONEY DEMAND, SUPPLY AND INFLATION

Inflation can be defined as a sustained increase in the general price lvel or, equivalently, as a sustained erosion of the value of money (i.e., the amount of goods and services that one unit of local currency — say a dollar or a Shekel) will buy.[3]

The equilibrium value of money, like that of any other commodity, depends on its demand and supply. People generally are not interested in the number of monetary units that they possess — their *nominal* money holdings; instead they are concerned about the

[1]The degree of the openness of an economy is measured by the importance of its economic relations with the rest of the world. In 1981 imports and exports were, respectively, equal to 68 percent and 48 percent of GNP in Israel (compared with 9 percent and 8 percent in the United States).

[2]Since the establishment of the state, Israel has always imported more than it exported, financing the difference by foreign grants and by the accumulation of foreign debt (which reached $18 billion at the end of 1981). The authorities were concerned about the possibility of future reduction in the availability of international finanacing and, to avoid the potential high costs of a rapid adjustment to a lower import surplus, aimed at its gradual reduction.

For additional information (in English) on the Israeli economy in general and on monetary policies and developments in particular, see Bank of Israel *Annual Reports* and *Economic Review*. See in particular Stanley Fischer, "Monetary Policy in Israel," Bank of Israel *Economic Review* No. 53 (May 1982), pp. 5-30. For an earlier period, see Nadav Halevi and Ruth Klinov-Malul, *The Economic Development of Israel*, (Praeger, 1968). See also Nadav Halevi, "Economic Policy Discussion and Research in Israel," *American Economic Review*, Supplement (September 1969).

[3]In 1980, Israel changed its monetary unit from the pound (IL) to the shekel (IS) at the ratio of 10 IL per IS.

Table 1
GNP, Prices and Unemployment

Period	Nominal GNP growth	Real GNP growth	Change in implicit GNP price deflator	Unemployment rate[1]
1960-65	18%	9.5%	8%	3.8%
1966-69	12	7.5	4	7.1
1970	17	7.9	8	3.8
1971	25	11.0	13	3.5
1972	28	12.3	14	2.8
1973	26	4.1	21	2.6
1974	41	4.6	35	3.0
1975	42	3.2	37	3.1
1976	29	1.3	27	3.6
1977	45	1.3	43	3.9
1978	63	4.1	55	3.6
1979	89	3.0	82	2.9
1980	133	2.7	128	4.8
1981	137	4.6	126	5.1

[1]As a percent of the civilian labor force.

SOURCE: Central Bureau of Statistics, *Statistical Abstracts of Israel* (1981).

Table 2
Allocation of Economic Resources

Period	Private consumption	Public consumption Total	Public consumption Defense	Investment	Import surplus[1]	Import surplus[2]
	(as a percent of GNP)					
1966-69	66%	28%	17%	22%	19%	$ 645
1970	61	36	25	29	27	1288
1971	58	34	23	32	24	1226
1972	57	31	21	33	21	1101
1973	59	44	33	34	37	1794
1974	62	42	30	33	33	3324
1975	62	45	35	33	40	4106
1976	65	42	32	28	34	3200
1977	63	37	25	25	25	2535
1978	65	40	27	27	31	3283
1979	64	36	23	29	29	3943
1980	62	37	25	24	23	3927
1981	63	39	27	22	20	4430

[1]The difference between the value of imports and exports.

[2]In millions of U.S. dollars

SOURCE: Central Bureau of Statistics, *Statistical Abstract of Israel* (1981).

Table 3
International Rates of Inflation (annual average percentage[1])

Country	1960-69	1970-73	1974-75	1976-78	1979-80
Israel	5.2%	12.7%	39.5%	39.2%	103.0%
United States	2.3	4.9	10.1	6.6	12.4
United Kingdom	3.4	8.0	20.0	13.5	15.7
Italy	3.7	6.6	18.1	15.3	17.9
West Germany	2.4	5.3	6.5	3.6	4.8
Argentina	22.2	40.3	86.6	245.7	128.3
Chile	28.5[2]	89.5	436.1	103.1	34.3
Brazil	44.2	17.9	28.3	41.5	67.1
Industrial countries	2.9	5.8	12.2	8.0	10.6
Western Hemisphere (excluding U.S. & Canada)	21.1	20.5	36.1	48.8	51.8
World	4.1	6.8	14.4	10.8	13.5

[1]Based on rates of change for average yearly price levels.

[2]Computed for 1964-69 period.

SOURCE: International Monetary Fund, *International Financial Statistics Yearbook 1981.*

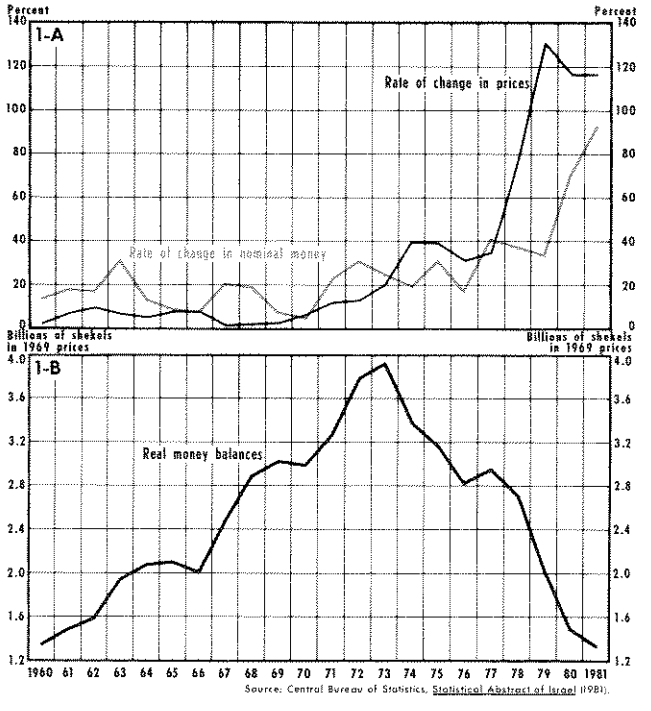
quantity of goods and services that their money balances can purchase — the *real value* of these holdings. In other words, the equilibrium value of money, or the price level, depends on the demand for real money balances and on the nominal money supply.[4]

Over time, the rate of change of the price level (i.e., the rate of inflation) will reflect the difference between the rates of growth of the nominal money supply and of the real money demand.[5] In analyzing an inflationary process, therefore, it is instructive to consider the forces governing the changes in real money demand and nominal money supply.

Chart 1a shows the rate of change of the narrowly defined money supply M_1 (local currency and demand deposits) and the rate of change of the consumer price level;[6] the difference between these two rates is the rate of change of the real quantity of money. An index of the real quantity of money is presented in chart 1b.

Chart 1 reveals that, since 1973, the real value of the money stock has decreased dramatically (by about 70 percent between the end of the 1973 and the end of

Chart 1
Money and Prices



[4]Formally, in equilibrium, $P = M^s/(M/P)^d$, where P is the general price level, M^s is the nominal money supply and $(M/P)^d$ is the real money demand.

[5]At any point in time, the price level may not equate exactly the demand for and supply of money; however, these deviations are of secondary importance when a longer period is considered. The exact relation among the equilibrium rates of change of the price level, money supply and money demand is $\hat{P} = (\hat{M}^s - \hat{M}^d)/(1 + \hat{M}^d)$, where $\hat{}$ represents a rate of change.

[6]Casual observation suggests a considerable use of foreign exchange bills and of checks drawn upon overdraft facilities for transactions in Israel. It has been suggested, therefore, that a more accurate definition of the "means of payments" should include foreign exchange cash holdings and lines of credit for overdraft; unfortunately, the statistical coverage of these variables is highly unsatisfactory.

1981). This reduction mainly reflected the reaction of the real demand for money to the increase in the cost of holding money — which bears no interest — as the rate of inflation accelerated and interest rates increased. The increase in money velocity was facilitated by financial innovation which, to a large extent, was also induced by the rise in the cost of holding money.[7] Some "autonomous" financial innovation was also present, and the demand for money also may have been affected by changes in real wealth.[8]

Even if the reduction in the real quantity of money were fully attributable to shifts in money demand, it could only explain a small part of the accumulated increase in prices.[9] Since the reduction in the real money balances was, in fact, primarily a product of inflation, the main factor explaining the Israeli inflationary experience is the behavior of the money supply.

2. THE SOURCES OF MONEY SUPPLY CHANGES IN ISRAEL

Changes in the nominal quantity of money can be apportioned between those originating from changes in the monetary base and those resulting from changes in the "money multiplier" (the ratio between the quantity of money and the monetary base).[10] Table 4 shows the extent to which the Israeli money multiplier has fluctuated from year to year. In some years, it has been an important determinant of the change in the money supply; over the long run, however, its changes have had only a secondary effect on the money supply. We shall, therefore, focus the analysis on the factors affecting growth in the monetary base.

Changes in the monetary base are created by the net flow of payments between the economic authorities and the private sector. In Israel, changes in the monetary base equal:

a) The domestic deficit of the government and other parts of the public sector in its nonfinancial activities;[11]

plus b) The net flows of loans from the public sector and the central bank to the private sector. These loans are granted on favorable terms to investors, exporters and to housing mortgages;

minus c) The net sale of foreign exchange by the Bank of Israel (B.O.I.) to the private sector;[12]

minus d) The net sale of government and B.O.I. debt to the private sector.

To demonstrate the significance of these flows, table 5 presents the evolution of the changes in the monetary base and in the flows affecting these changes as a

[7]The cost of holding money is the difference between the nominal return on other assets — physical assets and interest-bearing financial assets — and the zero nominal return on money. As the rate of inflation increases, the gap between the return on physical goods and money widens, and the rates of interest on financial assets adjust upward (either as a result of the incorporation of inflationary expectations in nominal rates of interest or the higher return gained on indexed assets). In recent years, there has also been an increase in real rates of interest in Israel (i.e., after allowing for the effect of higher inflation on the rate of interest).

The effect of the cost of holding money on financial innovation takes time to work out. This may at least partly account for the fact that real money balances continued to decrease for two or three years after each of the two major episodes of inflationary acceleration in Israel.

The income velocity of money, defined as the ratio between nominal GNP and M_1 (or, alternatively, between real GNP and real money balances) increased from 6 in 1973 to 24 in 1981.

[8]The real demand for money has been investigated by Leonardo Leiderman and Arye Marom in "New Estimates of the Demand for Money in Israel" (Bank of Israel [B.O.I.] Research Dept., June 1981) and by Rafael Melnick in "Two Issues Concerning the Demand for Money in Israel" (B.O.I. Research Dept., January 1982). Both studies point to strong effects of the cost of holding money on its demand. They found some parameter changes in the post-1977 period, but were unable to reject the hypothesis of the function stability by a Chow Test. (1977 was chosen as a possible turning point because of the many changes accompanying the foreign exchange reform, including the autonomous introduction of a new class of money substitute — see below.)

These authors did not investigate the impossible effect of a wealth shock on the demand for money around 1974. Such a shock may have resulted from the combination of the effect of the oil price increases and the increase in defense outlays. However, a wealth shock also should have affected the demand for private consumption, and there is no indication of a shift in consumption demand at the time.

[9]At the end of 1981, the price level was about 100 times higher than at the end of 1969 (and about 55 times higher than at the end of 1973).

[10]In this article, we use the Israeli "Broad Money Base." This aggregate excludes bank liquidity deficiencies, which are the Israeli counterpart of the U.S. borrowing at the discount window. For the purpose of money supply analysis, this aggregate is similar to the U.S. nonborrowed monetary base.

[11]The direct transactions of the Israeli government with the rest of the world have no effect on the monetary base and therefore only domestic deficits are included. The financial transactions of the authorities with the (domestic) private sector are included in (b), (c) and (d).

[12]Except for a few years, the B.O.I. has been a net seller of foreign exchange to the private sector and net purchaser of foreign exchange from the government. The government acquires foreign exchange through foreign borrowing and unilateral transfers from abroad, spends a part of the proceeds on its direct imports and sells another part to the B.O.I. to finance its domestic expenditures. As a result, the government has not accumulated a large debt to the B.O.I.

Table 4
The Money Multiplier and Its Contribution to Money Growth

Period	Money multiplier[1] (end of period)	Rate of change in the money multiplier	Contribution of change in the money multiplier to the change in money supply[2]
1961-69	1.23	0.1%	3%
1970	1.16	−4.9	−37
1971	1.04	−10.3	−37
1972	1.02	−1.9	−6
1973	1.07	4.9	14
1974	1.08	0.9	9
1975	1.24	14.8	67
1976	1.13	−8.9	−33
1977	1.07	−5.3	−13
1978	1.20	12.2	26
1979	1.28	6.7	23
1980	1.35	5.5	5
1981	1.14	−14.9	−18
1970-81	1.14	−1.3	—

[1]The ratio of M_1 to broad monetary base.

[2]Change in the money multiplier times monetary base at the beginning of the period divided by the change in M_1 during the period (and multiplied by 100).

SOURCE: 1960-69: Moshe Sanbar and Saul Bronfeld, "Monetary Thought, Policy and Development 1948-72," *Israel Economic Quarterly Review* (April 1973) and (September 1973).
1970-81: Bank of Israel Annual Reports.

Table 5
Sources of Change in the Monetary Base (as a percent of GNP)

Period	Domestic deficit of the public sector[1]	Net public credits		Sales of foreign exchange by the B.O.I.	Sales of public debt to the private sector	Change in the monetary base
		Government	B.O.I.			
1960-70	4.4%	—	—	—	—	2.0%
1971-72	5.2	—	—	−7.8%	—	5.5
1973-74	14.6	—	2.4%	4.0	—	3.0
1975-76	14.2	—	1.2	5.6	—	2.1
1977	9.2	3.5%	4.3	5.5	7.7%	4.0
1978	6.1	4.4	5.1	2.3	11.0	2.2
1979	3.7	4.2	5.1	6.4	5.4	1.2
1980	5.2	4.9	3.6	5.1	6.1	2.4
1981	10.2	4.2	−0.5	5.9	5.4	2.5

NOTE: Dash indicates data unavailable from accessible sources.

[1]Excluding financial operations. Based on national account data for 1960-76 and B.O.I. estimates of actual flows for 1977-81. The national account estimates for the share of domestic deficits in GNP for 1977-81 are respectively 11%, 10%, 8%, 8% and 15%.

SOURCE: Same as table 4.

percentage of GNP.[13]

The share of the domestic deficits of the public sector in GNP, already high by international standards in the 1960s, rose dramatically to 15 percent in 1973-74 and thereafter decreased, through remaining relatively high. These deficits increased primarily because of the higher level of defense expenditures imposed on the Israeli economy since the Yom Kippur War. Domestic defense expenditures rose from an average of 9 percent of GNP in 1968-72 to 16 percent in 1973-81.[14]

While we do not possess adequate quantitative information about the net flows of public loans to the private sector in the 1960s, we know that their magnitude (relative to GNP) was much lower than in the 1970s. Most of these loans were granted, until recent years, at low nominal interest rates that were adjusted to the increase in the rate of inflation only partially and belatedly.[15] This policy brought about a considerable increase in the difference between the flow of new loans, which reflected current prices, and the flow of old loan repayments, which was determined by the historically low prices and rates of interest.

Table 5 reveals that the increase in the share of public deficits and loans in GNP has not been accompanied by an increased reliance on monetary base expansion as a source of government finance (i.e., in the ratio of new monetary base creation to GNP). The average ratio of monetary base change to GNP over the 1973-81 period was equal to its 1960-72 value (2.5 percent). In other words, the net increase in purchases of public debt and foreign exchange by the private sector essentially offset the increase in the public deficits and credits.

3. THE ENDOGENOUS NATURE OF THE MONEY SUPPLY IN ISRAEL

The previous discussion raises the question: "Why did the Bank of Israel not increase the sale of foreign exchange and public debt to the private sector and thus bring about a lower rate of money growth and inflation?" The answer to this question is that open market operations in these two assets were governed by considerations other than achieving monetary control.

Sales (and purchases) of foreign exchange by the B.O.I. to the private sector are used mainly to stabilize the exchange rate, not to control money (and are generally not sterilized). The B.O.I. offers to sell (or buy) whatever quantities of foreign exchange that are necessary to stabilize the exchange rate at a policy-determined level (with minor fluctuations being tolerated in recent years). The rate of exchange determination and, consequently, the open market operation in foreign exchange is perceived as an instrument for achieving a gradual reduction in the import surplus, which is considered unmaintainable in the long run. In recent years, the B.O.I. has aimed at stabilizing the *real* rather than the nominal rate of exchange by equating the rate of exchange depreciation to the difference between the domestic rate of inflation and the rate of inflation in Israel's main trading markets.[16]

Most public debt was in the form of government bonds (some of which were held directly by the public and some of which served as coverage for long-term saving schemes, pension funds and the like). These bonds were indexed to the consumer price index and sold to the public in practically unlimited amounts at real rates of interest that were changed infrequently and within a relatively narrow range. Open market operations in public debt were used, to a large extent, to stabilize the real rate of return on government bonds in the secondary market. This policy may have reflected an evaluation that the demand for direct and indirect holding of government bonds is very sensitive to variations in the real rate of return.[17]

[13]Due to the way in which monetary base data were published, it is difficult to apportion the sources of change in the monetary base according to our functional classification for the full period considered.

[14]Due to increased defense imports, the increase in the share of total defense outlays in GNP was even higher (see table 2). Defense imports, like other direct government imports, however, have no effect on the monetary base (see above).

[15]Most loans to exporters have been indexed to the foreign exchange rate since 1977. The indexation of investment and mortgage loans, however, was delayed until 1979-81.

The structure of interest rates on public credits had significant adverse effects both on the efficiency of the allocation process and on income and wealth distribution.

[16]The real rate of exchange is defined as EP^*/P, where E is the nominal rate of exchange (domestic price of foreign exchange), P^* is the level of foreign prices and P that of domestic prices. Its rate of change is $\hat{E} - (\hat{P} - \hat{P}^*)$, where $\hat{}$ is a notation for rate of change and $(\hat{P} - \hat{P}^*)$ is the difference between the local and foreign rates of inflation. Note that the implications of a fixed real rate of exchange are different from those of a fixed nominal rate of exchange. While both imply an effect of the balance of payments on the monetary base, a fixed nominal rate of exchange tends to reduce the sensitivity of the local price level to expansionary domestic policies, by shifting the adjustment to the balance-of-payments flows.

[17]If this were the case, the government could have lowered the average rate of interest that it had to pay on a given amount of debt by its policy of real interest rate stabilization. This also may have affected the rates of interest charged on nongovernmental borrowers.

Some public debt was in the form of foreign-exchange-indexed deposits, the volume of which was determined in recent years by the private sector demand. The return on these deposits depended on the change in exchange rates and on international interest rates and was, therefore, not subject to manipulation for the purposes of monetary control.

Given the elastic supply conditions of foreign exchange and public debt, the private sector was able to determine its net acquisition of these assets and, thus, the net change in the monetary base. As a result, the quantity of money was largely endogenous — that is, determined by the economy rather than by explicit policy decisions. Thus, a recent econometric study has shown that the rate of money growth was significantly affected by past price changes.[18] This does not mean, of course, that the money supply played no crucial role in the inflationary process. It merely indicates that under the institutional arrangements prevailing in Israel the growth of money accommodated and validated prior price changes. The endogeneity of the money stock has an important bearing on the dynamics of the Israeli inflationary process.

4. INFLATION WITH AN ENDOGENOUS MONEY SUPPLY

A largely endogenous money supply has important implications for the behavior of short-run price increases, for the determination of the long-run rate of inflation and for the stability of the inflationary process.

The general price level is often subject to short-run movements that cannot be traced to previous changes in money growth or to shifts in the long-run demand for money. The general price level may react to changes in international prices, fiscal actions and many other forces that affect the equilibrium in commodity, factor and asset markets (e.g., by creating imbalances between the physical and financial components of the public's portfolios). If the money supply is endogenous, the adjustment of money growth can easily magnify and prolong the effect of these disturbances on the general price level — especially since the public is aware of the accommodating nature of the money supply. This could affect the public's inflationary expectations, resulting in further price increases, even higher growth of the endogenous money supply and downward adjustment of the real demand for money.

This mechanism, which has been at work in Israel for at least part of the period surveyed, explains why accelerations in the rate of price increases have tended to precede accelerations in money growth. Two factors especially have contributed to this mechanism in Israel: (a) The extensive system of indexation transfers price increases from one sector to another quickly and inflates the nominal values of indexed financial assets; (b) The experience with high and rising inflation has increased the speed with which prices adjust and shortened the lag between present price experience and changes in inflationary expectations.[19]

The endogeneity of the money supply also affects the determination of the long-run rate of inflation. With an exogenous money supply, the rate of inflation will converge in the long run to the difference between the given rate of nominal money growth and the rate of growth of real money demand, which depends principally on long-run real economic growth and the elasticity of the demand for money with respect to real GNP. When, however, the money supply is endogenous, as is the case in Israel, there is no predetermined rate of money growth to which the rate of inflation adjusts itself. In this case, both the long-run rates of money growth and inflation are determined simultaneously as a part of a larger and more complex full-equilibrium solution.[20]

A long-run equilibrium interpretation of the acceleration of inflation in Israel has been suggested by

[18]Elise Brezis, Leonardo Leiderman and Rafael Melnick, "Inflation and Monetary Variables: Their Interrelationship in Israel" (B.O.I. Research Dept., September 1981). Using a Granger exogeneity test, these authors found that information about past price changes improves the regression of money change on its past values both when short lags (several months to a year) and longer lags (up to two years) are considered. On the other hand, they found that information about past money changes improves the regression of price change on its past values only in the long run.

The long-run results were derived from annual data over a long period (1954-80). We have repeated these exogeneity tests using quarterly data over the 1965-80 period. These tests yielded a significant effect of money growth lagged up to three years on prices (and vice versa). When the 1970-80 period was considered, the effect of lagged money growth on prices was insignificant. Whether this result reflects a change of structure in the 1970s or is due to the small number of the degrees of freedom is unclear.

[19]The sensitivity of inflationary expectation formation to the level of inflation was investigated in Daniel Gottlieb and Sylvia Piterman, "Inflationary Expectations in Israel 1965-80" (B.O.I., Research Dept., 1981).

For more evidence on the adjustment of the Israeli economy to inflation, see Zalman F. Shiffer, "Adjusting to High Inflation — the Case of Israel," forthcoming in this *Review*.

[20]This solution will include the determination of long-run equilibrium values of the different components of table 6.

Melnick and Sokoler.[21] The essence of their argument is that the long-run equilibrium rate of inflation increased in the 1970s, because (a) the ratio of the revenue from money creation to GNP (the monetary base change/GNP ratio) has been kept unchanged, and (b) in view of the reduction in the rate of real GNP growth, the maintenance of a given monetary base change/GNP ratio required a higher rate of inflation.[22]

The unchanged average level of the share of revenue from money creation in GNP does not, by itself, prove that the inflationary experience of the last decade reflects a transition between long-run equilibrium rates of inflation. Alternatively, this experience could be viewed as the result of a sequence of disturbances, that, given the dynamics of an endogenous money supply, have not necessarily brought the economy to a new long-run equilibrium.[23] Under this view, the impact of money creation on the public revenue would be interpreted as a result of the acceleration of inflation, instead of its cause.

5. THE HISTORICAL RECORD OF MONEY AND INFLATION IN ISRAEL

Table 6 contains data relating the dynamic evolution of prices to money growth and other variables over the last decade. This table presents annualized rates of change of the price level, money (M_1), two larger monetary aggregates (M_4 and M_5), short-term bank credit and the local price of imports. M_4 is the sum of M_1 and a group of relatively liquid money substitutes — time deposits, CDs, some types of foreign-exchange-indexed deposits and tradable, CPI-indexed government bonds.[24] M_5, the largest monetary aggregate on which data are available for the whole period, is the sum of M_4 and some less-liquid savings accounts and foreign-exchange-indexed deposits. Similarly, short-term bank credit represents the largest credit aggregate on which data are available on a long-run basis. The domestic price of imports depends on the rate of exchange and on international prices.[25]

The last four measures are included, because they help illuminate the nature of the relationship between money and prices. These variables reflect, at least partially, the results of policy measures and external shocks and have affected real demands and costs. In particular, statistical tests indicate the existence of

[21]Rafael Melnick and Meir Sokoler, "The Government's Revenues from Money Creation and the Inflationary Effects of a Decline in the Rate of Growth of National Income" (B.O.I. Research Dept., 1981).

[22]Monetary expansion affects the public sector finances not only through the direct revenue that it generates, but also through the effects of the resulting inflation on taxation, government spending, the sale of indexed public debt and the erosion of the real value of the unindexed loans given by the public sector to the private sector. According to B.O.I. Report 1980 (p. 240), the loss due to loan value erosion is higher than the direct revenue from monetary expansion.

Given these relationships, there is no reason to assume that the authorities maintained a policy aimed at stabilizing the ratio between the direct revenue from monetary expansion (the monetary base change) and GNP. Note, however, that the Melnick-Sokoler argument does not depend on the existence of such a policy, but on the claim that there is a causal effect from the direct revenue from money creation to the rate of inflation. Their argument would also hold if, for example, this revenue was endogenously determined by the levels of public deficits and loans and by the foreign exchange and debt policies. The alternative view discussed below is that the main causal effect is from the rate of inflation to the revenue from money creation, and not vice versa.

Assuming, for simplicity, that the monetary multiplier is 1, the ratio of the direct public revenue from money expansion to GNP is: $\Delta M/PY = \hat{M}(M/PY)$, where Δ represents absolute change, $\hat{}$ proportional change and M, P and Y are respectively the nominal quantity of money, the general price level and real GNP. In the long-run equilibrium, $\hat{M} = (\hat{M}/PY) + \hat{P} + \hat{Y} = \hat{P} + \hat{Y}(1 + \eta)$, where η is the elasticity of the desired money-GNP ratio to real GNP. The long-run equilibrium revenue from money creation is $(M/PY)[\hat{P} + \hat{Y}(1 + \eta)]$, where (M/PY) depends on the expected rate of inflation, which in the long-run equilibrium is equal to the actual rate $\hat{P}$. This expression is a positive function of $\hat{Y}$, since $(1 + \eta) > 0$. When the rate of inflation is increased, (M/PY) decreases, but the "inflationary tax" $(M/PY)\hat{P}$ increases, provided that the elasticity of the demand for money with respect to inflation is lower than unity in absolute terms; this is the case in Israel as well as in most other countries.

[23]The problem of the convergence of an economy with an endogenous money supply to a long-run stable inflationary equilibrium is discussed in D. Chappell and D. A. Peel, "On the Dynamic Stability of Monetary Models when the Money Supply is Endogenous," *Manchester School* (December 1979), pp. 349-58. The authors assume that the government maintains a given real level of revenue from money creation.

In recent years, it has been argued that the Israeli economy might have moved into a stage of "bubble inflation" in which the rate of inflation is indeterminate and can explode as a result of any disturbance or change in expectations. This extreme view is not supported by the evidence: as discussed below, the two principal stages of inflationary acceleration in Israel have been triggered by nontrivial sequences of events and culminated in periods of relative inflationary stability.

[24]The liquidity of these assets is enhanced by the above-discussed policies of foreign exchange and real bond interest rate stabilization. While none of these assets serves as a direct means of payment, each is largely held as temporary abode of purchasing power due to its relatively low real risk. Due to the low level of transaction cost relative to the rate of return, these assets are largely purchased for periods of a few weeks. At the end of the 1970s, the velocity of the liquid foreign exchange deposits was close to the velocity of checking accounts at the beginning of the decade.

[25]Due to data limitations, the rate of change of this variable is based on end-of-period quarters (and not months). This implies that a large import price increase which occurs at the end of a quarter (like the 1974 devaluation) will also affect the next quarter data.

Table 6
Rates of Change of Prices, Monetary Aggregates and Credit

Period	Consumer price index	M_1	M_4	M_5	Short-term bank credit[1]	Import prices[2]
1971	13%	28%	35%	36%	1%	26%
1972	12	29	28	25	42	9
1973	26	32	50	47	32	31
1974	56	18	73	60	71	51
1975	23	22	17	26	32	32
1976	38	27	19	33	39	36
1977	43	39	45	67	85	62
1978	48	45	58	61	55	52
1979	111	30	83	100	101	102
1980	133	90	148	141	110	133
1981	101	78	91	100	87	—
6/70-9/73	15	26	34	34	23	19
9/73-12/74	53	24	46	56	64	48
12/74-9/77	30	29	18	30	37	32
9/77-12/78	56	41	78	90	86	77
12/78-12/81	96	59	92	98	87	—

NOTE: M_1 = Cash and checkable demand deposits.
M_4 = M_1 + unindexed time deposits + certificates of deposit + foreign-exchange-indexed residents deposits (excluding deposits originating from personal restitution payments from the Federal Republic of Germany) + tradable government bonds.
M_5 = M_4 + long-term saving schemes and deposits + foreign-exchange-indexed deposits originating from personal restitution payments from the Federal Republic of Germany.

[1]Includes both credit directed by the B.O.I. and "free" credit. This series is not fully consistent over time.

[2]Based on quarterly data. These data currently are undergoing revision at the B.O.I.

SOURCEs: B.O.I. and Statistical Abstracts for Israel data.

short-run effects from both M_4 and short-run bank credit to prices.[26] The interpretation of the relationship between these variables and prices, however, must be done carefully, since they are themselves largely endogenous. In particular, the broader monetary aggregates and credits include sizable indexed components, and the rate of exchange also is strongly affected by prices (especially since 1979).

The Early Period: From Mid-1970 to September 1973

The transition of the Israeli economy from low to high inflation began in mid-1970; until then, Israel had experienced 16 years of low inflation at about 5 percent per year.[27] The rate of price increase hit the 10 percent range in 1970, rose marginally in 1971-72 and in the first nine months of 1973 (before the outbreak of the Yom Kippur War) accelerated to an annual rate of 21 percent.

The first round of the higher price increases in 1970 was due to increased indirect taxation, not to an earlier

[26]See Brezis, Leiderman, Melnick, "Inflation and Monetary Variables." They found a strong short-run effect from credits to prices, weaker effects of M_4 on prices and strong effects of prices on both M_4 and credit. Credit and the large monetary aggregates have (not surprisingly) more stable velocities than M_1.

In recent years, the B.O.I. has used M_4 and short-run bank credit as principal monetary indicators and policy targets. The short-run effect of bank credit on prices may be due to their effects on the short-run business liquidity. In Israel businesses have limited access to alternative sources of finance in the short run and react to credit squeezes by reducing inventories — both through changes in production and through changes in pricing decisions.

[27]The country had experienced higher inflation during World War II and its first years of independence.

increase in the growth of the money supply M_1.[28] However, money growth took off in the second half of 1970, reaching an average annual rate of growth of 26 percent between June 1970 and September 1973 (compared with a 15 percent average annual increase in prices — see table 6). This monetary accumulation was part of a general build-up of financial assets. Both M_4 and M_5 grew at 34 percent per year over the same period as a result of high net sales of foreign exchange by the public to the Bank of Israel.[29]

It would, however, be inaccurate to attribute the acceleration of inflation in that period solely to forces operating on the supply of money. Between June 1970 and September 1973, the domestic price of imports rose at an annual rate of 19 percent, following the imposition of import duties in 1970, a 20 percent devaluation in 1971 and international price increases in 1972-73. Had the quantity of money continued to grow at a low rate, these import price increases would have had a much smaller effect on the general price level (probably joined with lower real activity). However, the fact that money growth began to accelerate only after the first round of price increases (in spite of an earlier increase in the larger monetary aggregates) indicates that it was, at least in part, adjusting to the short-run effects of higher import prices.[30]

Finally, one should note that in this period, the increase in the local price of imports was to a certain extent exogenous to the inflationary process, since it was caused by higher foreign commodity prices. On the other hand, lower money growth may have prevented the 1971 devaluation or reduced its size.

From the 1973 War to the Foreign Exchange Reform

The October 1973 war and the ensuing political and economic international events had strong and lasting effects on the Israeli economy. The real rate of growth fell, higher defense and oil import bills widened the current account deficit and the rise in domestic defense expenditures increased governmental deficits.

Following the outbreak of the war, the B.O.I. conducted a permissive policy, in particular encouraging rapid credit growth. As time passed, however, economic policy began to reflect the growing concern over the balance-of-payment situation. Monetary policy became more restrictive, indirect taxation was increased and, in November 1974, the rate of exchange was devaluated by 43 percent.

The effect of the international oil price increase, the changes in taxation and the devaluation led to sharp price increases which were largely accommodated. The larger monetary aggregates grew rapidly throughout 1974 (although more slowly than before in real terms). The growth of M_1, on the other hand, was considerably lower than that of the price level, thus squeezing the real value of the money balances. This development reflected mainly a downward adjustment of real money demand to the higher rate of inflation (see section 1).

The transition to restrictive policies had visible effects in the 1975-77 period. Domestic and foreign deficits shrank, economic activity was low, and all the monetary aggregates grew more slowly than the price level. The rate of inflation came down from its 1974 peak; it remained, however, considerably higher than in the pre-war period.

In June 1975, the government adopted a policy of small and frequent devaluations of about 2 percent per month (a "crawling peg system").[31] This policy was motivated by the continuing concern about the balance of payment and a desire to avoid the strong destabilizing effects of large, infrequent devaluations.[32] As a result of this policy and the absence of external supply shocks, the fluctuations in the rate of inflation were reduced considerably.

From October 1977 to the Present

In October 1977, the government embarked on a foreign exchange reform intended to contribute to

[28]The quantity of money rose at an annual rate of 13 percent between the end of 1966 and mid-1970 (compared with an average 9 percent real GNP increase) and increased even more slowly in the last 18 months of that period.

[29]The increased sales were due to the combination of an improvement in the private current account and a capital inflow induced by relatively high domestic rates of interest and a booming economy.

[30]That the quantity of money was adjusting to demand and not just to supply conditions is evident from the fact that its growth was considerably lower than that of the large monetary aggregates both in 1973 and afterward, as higher inflation affected the real demand for money.

[31]The transition to the crawling peg system at that time might have been interpreted as a signal that the government was more committed to adjusting to inflation than to undertaking strong anti-inflationary policies.

[32]The expectations for the 1974 devaluation had produced large private capital flows, and the devaluation itself brought about a sharp increase in the general price level.

greater economic efficiency. This reform included:

1) further steps in the liberalization of foreign transactions, in particular of international capital inflows and direct holding of foreign-exchange bills;

2) the creation of a universally accessible class of foreign-exchange-indexed deposits;[33]

3) the abolition of direct export subsidies and the reduction and unification of import duties;

4) a transition from the crawling peg system to a market-determined, flexible exchange rate.

As the reform was enacted, the exchange rate depreciated by 47 percent and the general price level partially adjusted upwards.[34] As a result of the automatic indexation, the value of financial portfolios also increased.

Between the reform and the end of 1978, the larger monetary aggregates rose at exceptionally high rates, even when the effect of indexation is taken into account. Thus, M_4 and M_5 grew respectively at 78 percent and 90 percent annual rates between September 1977 and December 1978 compared with a 56 percent annual increase in the CPI. This increase was fed, to a large extent, by sizable public loans to exporters and arge capital inflows, which were made possible by the reform and induced by the difference between the foreign and domestic interest rate.[35] This upsurge in public loans and capital inflows reduced the level of real interest rates. The new foreign-exchange-indexed deposits, which offered an attractive mix of liquidity and rate of return, increased rapidly; on the other hand, the growth of M_1 was slower than that of the price level.

The increase of the large monetary aggregates and the lowering of real interest rates played a major role in the increase of real domestic demand and economic activity in 1978 and early 1979.[36] As the stock of financial assets rose relative to both physical assets and income, the private sector increased its demand for physical assets and other goods and services (especially as investment and purchases of durable goods had been low in previous years). The housing market, a traditional leading sector, experienced a boom, GNP increased rapidly and wages also rose with the demand for labor. Unconstrained by the largely adaptive money supply process, these developments culminated in a dramatic acceleration of the rate of price increase to about 80 percent in annual terms at the end of 1978 and the beginning of 1979.[37]

The authorities were alarmed both by this sudden acceleration of price increases and by the fact that, since the reform, the rate of exchange rose considerably more slowly than the general price level. At the beginning of 1979, the B.O.I. imposed restrictions on capital inflows and domestic bank credit growth and began to stabilize the real rate of exchange through intervention in the foreign exchange market.[38] The restrictive effect of these measures, which were continued throughout the next years, was reinforced in 1979 by a more restrictive fiscal policy and increased purchases of foreign exchange by the private sector from the B.O.I.[39]

[33]Before the reform, foreign exchange deposit holding was limited to agents engaged in foreign trade, banking institutions, recipients of foreign incomes and non-residents. Strictly speaking, the introduction of the new deposits was not part of a foreign exchange reform, since they are domestic deposits indexed to the foreign exchange, not claims on foreign exchange. These deposits are not checkable.

[34]The high depreciation reflected in part the adjustment of the formal rate of exchange to the reduction of export subsidies and import duties. The price level rose by 18 percent in the last quarter of the year, compared with an average of 6.5 percent in the three former quarters. Most of the price increase in the last quarter occurred immediately after the depreciation.

[35]The domestic cost of foreign borrowing is $i^* + \hat{E}^e$, where i^* is the foreign rate of interest and $\hat{E}^e$ the expected rate of exchange depreciation. Capital inflows at the end of 1978 also were affected by the anticipation of the imposition of constraints on their movements (see below).

[36]High public demand and expectations related to the beginning of the peace-making process with Egypt also contributed to the heating up of the economy.

[37]This was twice the annual rate prevailing during the first three quarters of 1978.

Some observers have argued that the end of 1978 price acceleration reflected a delayed reaction to the end of 1977 massive depreciation and relative increase in the price of tradable goods. Such a delayed reaction would have been unusual compared with earlier (and later) adjustments to cost shocks. In addition, the correction of an "excessive" increase in the relative price of tradables would have implied logically only a future lower rate of increase in the rate of exchange relative to the rate of inflation, not necessarily an acceleration of inflation.

[38]Starting in 1979, the B.O.I. generally imposed periodic ceilings on bank credit growth. These ceilings were partially accommodated to deviations of the rate of price increase from its projected path to reduce the effects of strong real credit crunch on private economic activity. The B.O.I. also imposed a levy on foreign exchange credits (exempting exporters and other favored borrowers).

The aim of the intervention in the foreign exchange market was to equate the average monthly rate of depreciation to the difference between the local and foreign rates of price increase (thus controlling the average real rate of exchange along a "purchasing power parity" path). The B.O.I. did not intervene to prevent "tolerable" daily fluctuations of the rate.

[39]The private sector's current account deficit increased as a result of the rise in oil prices and the high demand for imported durables at the beginning of the year. The demand for the highly taxed durables also affected the government deficit.

Due to the effect of indexation and higher inflation, the large monetary aggregates increased more rapidly in 1979 than in 1978, but they were squeezed in real terms. M_1 increased at an even slower rate than in the previous year and its real value decreased by 38 percent. This reduction may have been affected by the supply forces that reduced the real values of financial portfolios in general, but principally it reflected a reaction of the demand for (non-interest-bearing) money to higher inflationary expectations.

Real rates of interest on private credits increased dramatically and real demand and economic activity slowed down in the second half of 1979 and in 1980.[40] Still, the rate of the price increase rose to a new annual peak of 150 percent in the second half of 1979, reflecting the short-run effects of energy prices and the reduction of price subsidies.

The rate of inflation remained stubbornly high in 1980 (133 percent), apparently as the higher rates of recent price increases were incorporated into inflationary expectations and the still remaining nominal contracts. The growth of the large monetary aggregates outpaced that of price increase and M_1 grew at 90 percent — still falling in real terms.[41]

The economy resumed a higher real rate of growth in 1981, and, at the same time, the rate of inflation went down. This decrease was led by the short-run effect of a reduction in indirect taxation, which brought the rate of price increase to 94 percent in annual terms in the first two quarters of the year. Later on, the rate of price increase rose again.

As a result of the reduction in indirect taxation and the adjustment of income tax brackets, there was a sharp increase in the share of the domestic public sector deficit in GNP in 1981. This effect, however, was offset to a large extent by a reduction in the net flow of B.O.I. loans to exporters. The real value of the M_1 balances continued to fall, but the growth of M_5 kept up with the rate of inflation.[42] In addition, there was a sharp increase in the real growth of other financial assets.[43]

6. CONCLUDING REMARKS

The Israeli experience demonstrates the inflationary hazards of economic policies that subordinate monetary management to the achievement of other goals.

The inadequate monetary control was technically caused by the expropriation of open market operations in public debt and foreign exchange from the arsenal of monetary instruments. More basically, it reflected the low priority of price stability when compared with other policy goals. This preference was due, to a large extent, to the ability of different economic groups to reduce some of the costs of inflation by indexation and other adjustment mechanisms.

Under the favorable conditions prevailing in the 1950s and 1960s, the Bank of Israel was able to maintain a reasonable monetary growth despite the constraints on its policy tools. This situation changed in the 1970s. In that decade, the Israeli economy was taxed heavily by changes in its defense requirements and the international economic environment. The control over monetary growth was lost, and the economy veered rapidly toward high inflation.

Israel has gone a long way along the path of adjustment to inflation, but has been unable to neutralize fully its long-run disruptive effects. The experience with the implementation of partial anti-inflationary measures in 1979-81 reveals also that indexation and other contrivances have not eliminated the short-run costs of disinflation.

The return to reasonable price stability requires effective control over monetary growth.[44] To achieve

[40]Real demand and certain financial demands also were affected by the anticipation of additional stricter government measures.

[41]The increase in the large aggregates was due, in part, to the effects of lower economic activity and real demands on taxation and the current account, a reversal of the 1979 developments. In addition, the real market value of government bonds, which had fallen in 1979, went up again.

[42]M_4 was reduced somewhat in real terms. This was due to the successful marketing of new saving schemes with shorter redemption periods (saving schemes are included in M_5 but not in M_4).

It is interesting to note that, while real M_1 continued to decrease in 1981 in spite of the reduction in the rate of inflation, the demand for unindexed money substitutes (mainly CDs) increased rapidly. As a result, the value of M_1 plus the unindexed money substitutes (known as M_2) increased in real terms — for the first time since 1972.

[43]In recent years, financial concerns have largely intervened in the stock exchange market to minimize reductions in the *real* market value of their stocks. This behavior has led to the argument that financial shares may be close in liquidity to government bonds. If the market value of these shares is added to M_4 and M_5, the rate of growth of these "augmented" aggregates would be much higher than the price level in 1981. Pension funds and other forms of long-term savings that are not included in M_5 have also grown rapidly in recent years.

[44]The choice of the specific target aggregate should depend on the nature of the relationship between different alternative aggregates and prices and on the controllability of different aggregates. While the first of these issues has been only partially investigated in Israel, it seems that aggregates that are tied to an unindexed monetary base (like M_1) could be more easily controlled than others (like M_4).

this, the management of at least one of the major sources of monetary base change must be subordinated to monetary considerations. Given the committment to real exchange rate stabilization in Israel, it seems that the best way to achieve monetary control in Israel is through the use of public debt management as an instrument of monetary control — a solution adopted in many other countries. It should be recognized, however, that if, at the same time, the real value of public deficits and loans is not reduced, the Bank of Israel will be confronted continuously with pressures to adopt accommodating policies.[45]

The optimal pace of disinflation in Israel may be more rapid than in lower-inflation economies that have not developed similar price adjustment mechanisms. Whatever the pace chosen, it is important that disinflation be carried out in a consistent way, since stop-go policies reduce the credibility of the policymakers and raise the pains of disinflation; in a democratic society like Israel, such policies may even altogether frustrate the disinflationary effort.

[45]These pressures may arise in reaction to two possible effects of high levels of public deficits and loans: a) these deficits and credits may create short-run upward pressures on the rate of inflation — either through the direct effect of the demand that they finance, or through the effect of rapid public debt accumulation by the private sector; b) to the extent that large net sales of public debt are used to finance public deficits, they exert upward pressure on real interest rates and crowd out private borrowers.

While the reduction of public deficits and loans also can contribute to a more efficient resource allocation, the use of direct cost-reducing measures in the process of inflationary deceleration is more problematic (cost-reducing measures include reductions in indirect taxation, the lowering of the real rate of exchange and intervention in private price and wage determination). Such measures may increase the public sector deficit, induce destabilizing speculation and interfere with the efficiency of resource allocation. They should, therefore, be considered only as a short-run expediency and as a part of a comprehensive policy based on monetary control and lower public deficits and loans.